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MEDICAL PRODUCTS



MEDICAL LASER

The benefit of lasers in medicine was discovered only shortly after the development of the first laser in 1955. The first laser treatments were performed in dermatology and ophthalmology.

In the meantime, the laser is used in many medical fields such as surgery, dermatology, urology and many more. Not only is it used to treat illnesses, but also increasingly for diagnostic purposes.

The advantages of the laser are apparent: Laser treatment, as opposed to the conventional method, is less painful for the patient, sutures become partly superfluous, and the wound bleeds far less due to being cauterized, while simultaneously being decontaminated (sterile).



LightGuideOptics USA // Sales Office California

Z-Light // Production & Development

LightGuideOptics Germany // Headquarter Sales Office



TABLE OF CONTENTS

ABOUT USPage 8

OUR PRODUCTION.....Page 10

QUALITY STANDARDSPage 11

BARE FIBERPage 12

TAPERED BARE FIBER.....Page 14

CYLINDRICAL DIFFUSERPage 16

GASCOOLED FIBERPage 18

ENDOPROBEPage 20

SIDE FIRE FIBER.....Page 22

SATURN SIDE FIBER®, SATURN SLIGHT SIDE FIBER .Page 24

TRANSRADIAL INTRODUCER SETPage 26

VENA INTRODUCER SET.....Page 28

MEDICAL BUNDLE.....Page 30

MEDICAL JUMPER CABLE.....Page 31

FIBER OPTICS RFID COMPONENTS.....Page 32


HANDPIECES.....Page 33





QUALITY CHARACTERISTICS OF OUR MEDICAL PRODUCTS


- SMA 905 connector
(Other types of connectors available upon request)
- Length: 3 m
(Fibers and fiber lengths according to customer specifications possible)
- ETO Sterile
- Stability: 5 years
- Single Use / Reusable
- Double sterile packaging
- Biocompatible materials
- RFID chip and required license for all fibers


MEDICAL FIELDS


 ArthroscopyPage 12, 14


 Otorhinolaryngology.....Page 12, 14


 DentistryPage 12, 14


 Phlebology.....Page 24, 26, 28


 Ophthalmology.....Page 20


 Dermatology.....Page 12, 14


 UrologyPage 12, 14, 22


 Gynecology.....Page 12, 14, 22


 Gastroenterology.....Page 18


 Bronchology.....Page 18

 Photodynamic therapyPage 12, 14, 16, 24

 AngioplastyPage 12, 14

 Aesthetic surgery.....Page 12, 14

 Orthopedics.....Page 12, 14

 PneumologyPage 12, 14, 18

INCREASE YOUR VIEW

'to increase' means to reproduce, to heighten, to intensify. For us it describes the claim to being the technological leader in the field of fiber optics, now and in the future. We are constantly expanding our knowledge, thus also continuously increasing our own quality standards. We intensify the cooperation with our customers from the medical technology sector on this basis. We live up to these standards at all locations worldwide: the headquarters in Rheinbach near Bonn, the division in California, USA and the production facility in Latvia.

We conduct research, develop and produce all in one

Equipped with modern process technology and two state of the art draw towers, a workforce of over 100 conduct research, develop and produce innovative fiber optic products coordinated to the requirements of the various medical disciplines. This results in high-quality standard applications and special solutions individually tailored to customer requirements.

We live a communication based on trust

Honest communication based on mutual respect is important to us. This not only applies to the procedures within our Group, but also to the dialogue with our customers. Ultimately, it is the short communication paths and flat hierarchies that enable fast reaction times and clever solutions, even when very special requirements are demanded of the fiber optic products.

Our know-how in fiber optics, adequate for your requirements

In many medical applications, our fiber-optic technologies have already become indispensable. Successful products such as the tapered bare fiber are for example found on the input side at the proximal end, where the laser spot diameter is greater than the fiber diameter required on the application side, at the distal end. We also develop and supply innovative solutions for industrial processes and draw on a wealth of long-standing experience. We prepare our fibers in countless variants, individually suited to any application you may require.

We score with ingenuity

Complicated customs formalities? Special quality management criteria? Particular hygiene regulations? As a modern company, we find intelligent solutions every day, which reach far beyond the actual product level. We are ready for growth and innovation: Side by side with our customers from the medical technology sector.



PRODUCTION AND DEVELOPMENT

Our production portfolio is manifold: Beginning with the drawing of the actual fibers over the production of the required mechanical components through to the manufacture and packaging of your individual medical probe. When purchasing the preform we base our choice on your specific requirements. In doing so, we ensure right from the start that your application is equipped with the best possible fibers.

In the field of research and development we constantly optimize the economic efficiency and application options of our fibers. Our customer proximity and the tireless commitment of our development team reflect in the quality and diversity of our products. Here too, our guiding principle is: Increase your view – innovation by ingenuity, technical competence and a strategic approach beyond the horizon.

QUALITY STANDARDS

Our company is certified as an acknowledged manufacturer and supplier for laser probes and medical fiber products in accordance with DIN EN ISO 13485: 2010. For us, this includes the consistent implementation and strict fulfilment of all statutory and normative requirements applicable for medical products.

We begin with our paramount quality and safety standards at an early stage in the manufacture of our products. This not only incorporates coordinated supplier management, but also adherence to the official monitoring specifications for clean rooms and strictly controlled production and storage facilities. To ensure this we have the corresponding workplaces and all steps towards product manufacture re-

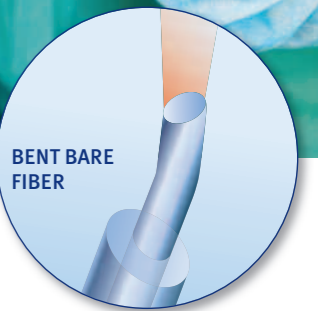
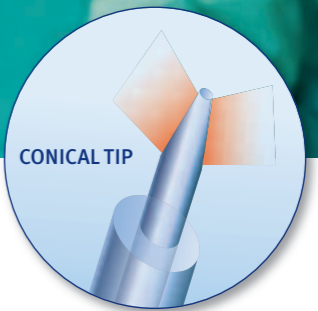
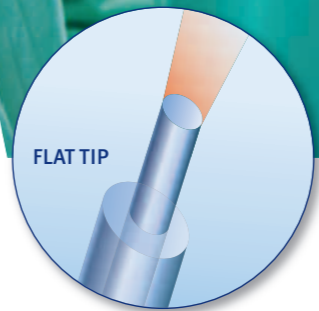
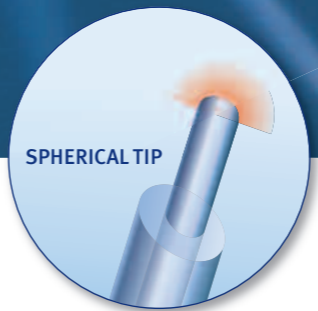
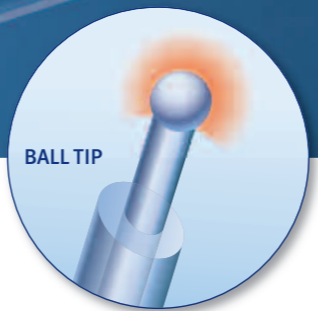
gularly inspected by an accredited microbiological institute. Our laser probes are subsequently sent on to a certified sterilization company in Germany in double sterile wrapping and safely packaged in high-quality cardboard boxes. Here the probes are sterilized in one of the most modern ethylene oxide sterilization plants. The validated stability of our products in the double sterile packaging is five years.

Based on the daily work of our quality managers and safety officers combined with our long-standing experience and in-depth knowledge of production and process sequences as well as excellent collaboration with our partners, we deliver maximum quality.



**DIN EN ISO
13485: 2010**





BARE FIBER



The bare fiber is the medical probe with the most versatile application areas. It is ideal for almost all medical disciplines. The fiber plays an important role for example in surgery, dermatology, gynecology, otorhinolaryngology, ophthalmology, photodynamic therapy, pneumology and urology. It is decisive, which fiber tip (distal end) with the corresponding emission is used. Our customers can choose between flat, conical, ball and spherical fiber tips. Furthermore we also offer the bent bare fiber, a bare fiber with a bent fiber tip, for specific requirements. Quartz/ quartz fibers for the UV and IR fields are also available as required. Upon request the fibers can also

be equipped with a hard clad. The fiber, just as – all other fibers, – can be prepared with various connector types (standard SMA 905 and free-standing SMA 905). Depending on the requirements, the bare fibers are produced with a numerical aperture (NA) from NA 0.12 up to 0.37. The probe is suitable for various types of lasers and can be produced in the most diverse customized versions. Finally we offer the bare fiber with the flat tip not only as a disposable fiber, but also as a reusable medical product. Together with the fiber we provide the corresponding instructions for permissible reprocessing methods.

In addition it is possible to equip the probe systems with an RFID chip including the required license which can be obtained from us (cf. page 32: RFID components). We of course also offer individual solutions.

FIBER TYPE	Quarz/ Quarz, Quarz/ Quarz/ Hard Clad Quarz/ Hard Clad
FIBER COATING	Polyimide, Nylon, Tefzel, Acrylate
FIBER CORE DIAMETER	200 µm, 400 µm, 600 µm, 800 µm, 1000 µm
FIBER ENDS	Flat tip, conical tip, ball tip, spherical tip Bent tip

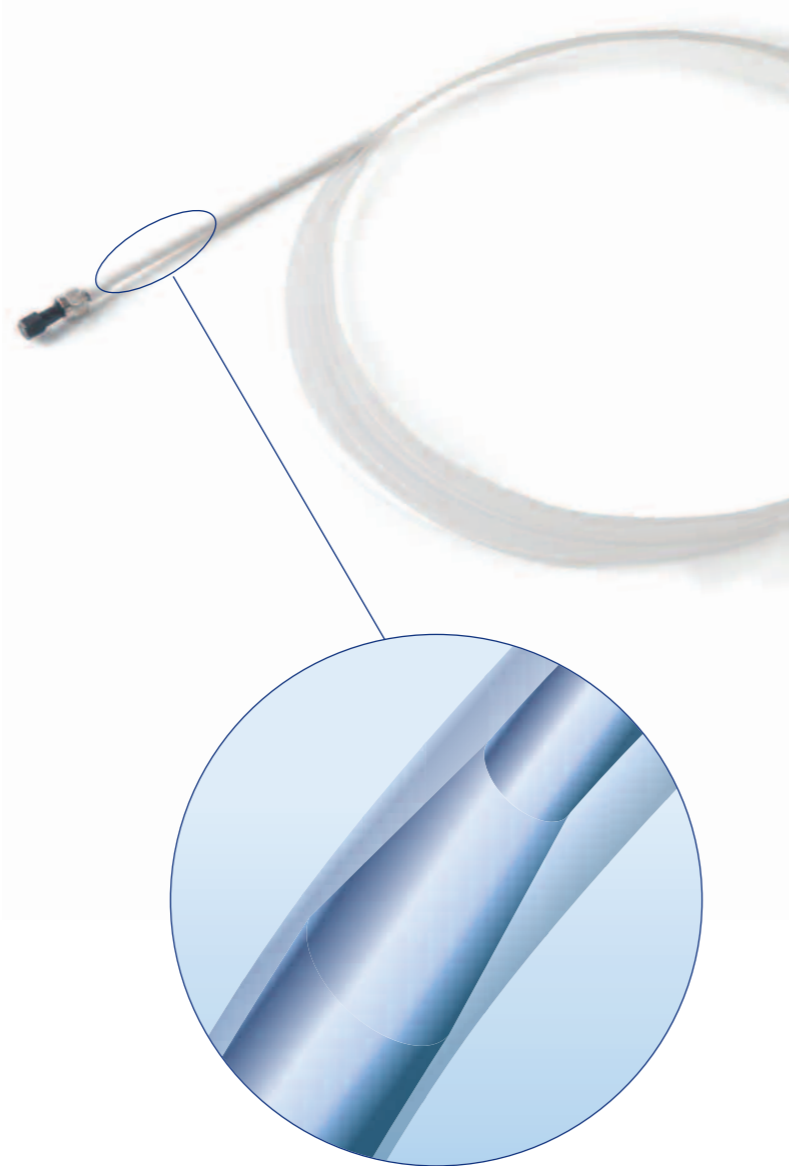
TAPERED BARE FIBER



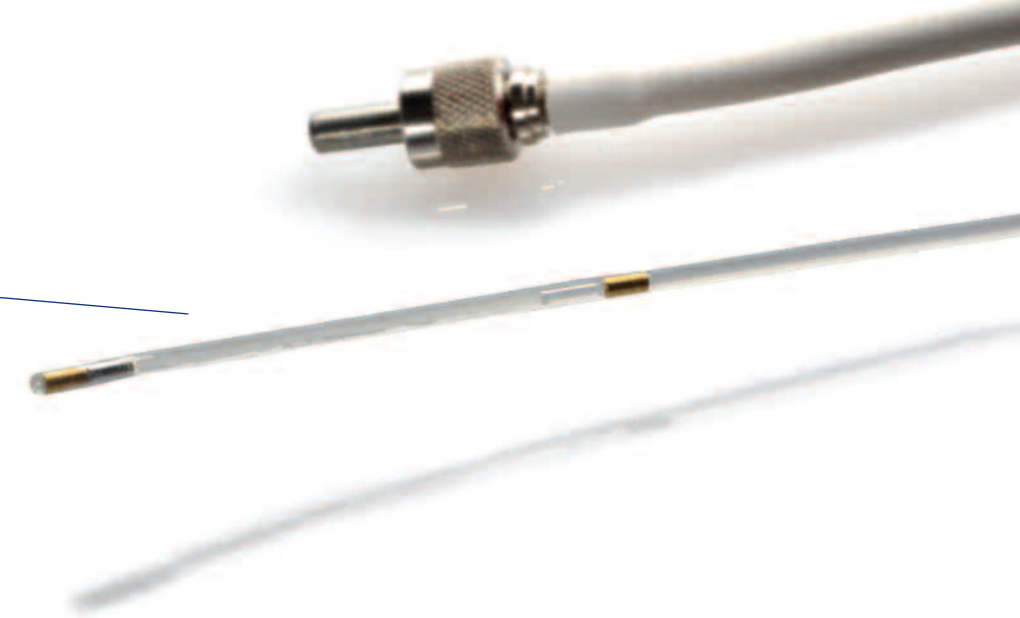
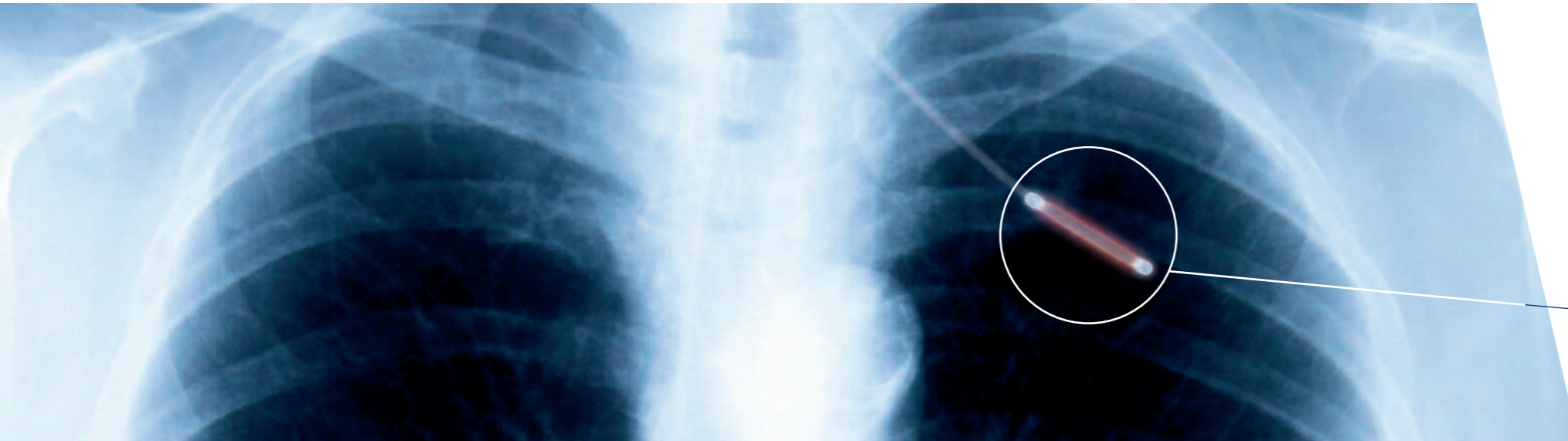
The tapered bare fiber has clear benefits for customers who couple into the fiber with a larger light diameter on the laser connector side than is required on the application side (distal end). This enables flexible use of laser appliances: On the one hand lasers designed for large 400/600/800/1000 μm fibers, and on the other hand lasers suitable for applications with 200 μm fibers. Excellent performance is achieved due to the taper, and sufficient optical energy is supplied on an extremely small spatial unit. More flexible handling of the probe and technical adaptation to the laser are of particular advantage. Taper technology is also possible for all other fiber types.

Possible product variants follow the bare fiber product range and comprise fiber core diameters of 200 μm , 400 μm , 600 μm , 800 μm and 1000 μm . Furthermore, all possible fiber ends are available: Ball Tip, Spherical Tip and Bent Tip.

In addition it is possible to equip the probe systems with an RFID chip including the required license which can be obtained from us (cf. page 32: RFID components). We of course also offer individual solutions.



FIBER TYPE	Quarz/ Quarz, Quarz/ Quarz/ Hard Clad,
FIBER CORE DIAMETER	200 μm , 400 μm , 600 μm , 800 μm , 1000 μm
FIBER ENDS	Flat tip, conical tip, ball tip, spherical tip, bent tip
CORE RATIO	1:2



CYLINDRICAL DIFFUSER



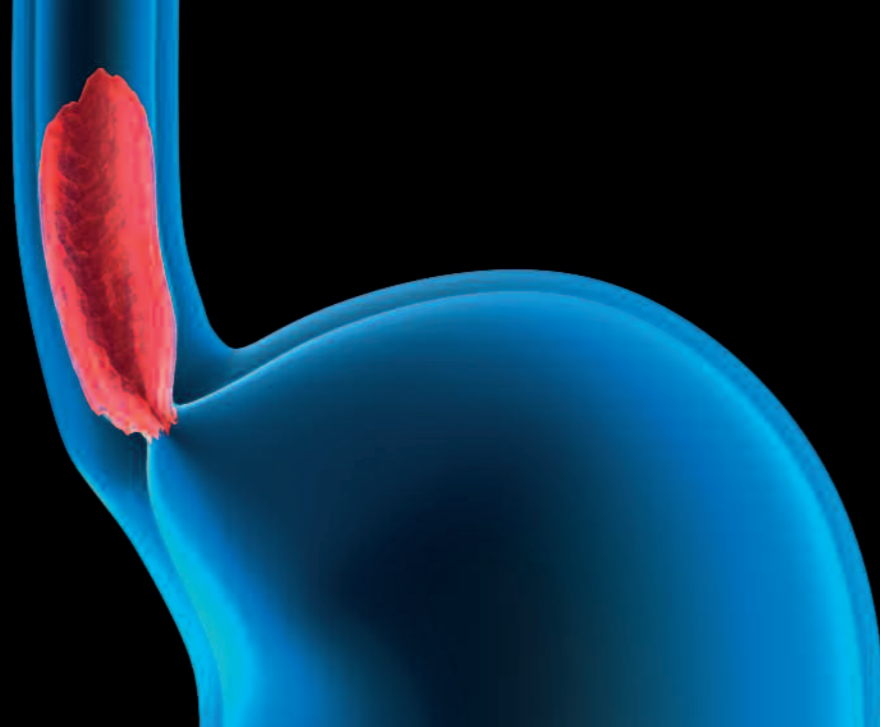
The LGO cylindrical diffuser is designed primarily for photodynamic therapy (PDT) with all conventional laser models. Due to its small exterior diameter and its high flexibility, it is particularly suitable for endoscopic methods in PDT. Customers can order the probe in various sizes, depending on their requirements. The active length for example varies between 10 and 100 mm. The cylindrical radial beam profile is consistent over the active length of the diffuser.

Our cylindrical diffusers are equipped with x-ray markers to ensure easy and correct positioning at the point of application. Upon request we also produce the probe without

x-ray markers. Photodynamic therapy is a modern therapeutic method for the treatment of tumors and pathological tissue changes such as skin cancer and skin diseases. The patient takes a so-called photosensitizer (a light-activated substance), which particularly accumulates in the tumor. After a short time the tumor is irradiated and damaged using light with a suitable wavelength. In addition it is possible to equip the probe systems with an RFID chip including the required license which can be obtained from us (cf. page 32: RFID components). We of course also offer individual solutions.

	CYD 400	CYD 600
Exterior diameter	1.20 mm	1.56 mm
Standard length	3.0 m	3,0 m
Typical transmission	80%	80%
Active diffuser length	5 mm - 90 mm	5 mm - 90 mm
Wavelength	600 nm - 800 nm	600 nm - 800 nm
Core diameter	400 µm	600 µm
Fiber connector	SMA 905	SMA 905
Bending radius	40 mm	60 mm
Numerical aperture	NA 0.22 - 0.37 (+/- 0.02)	NA 0.22 - 0.37 (+/- 0.02)

All diffusers are also available with x-ray markers.

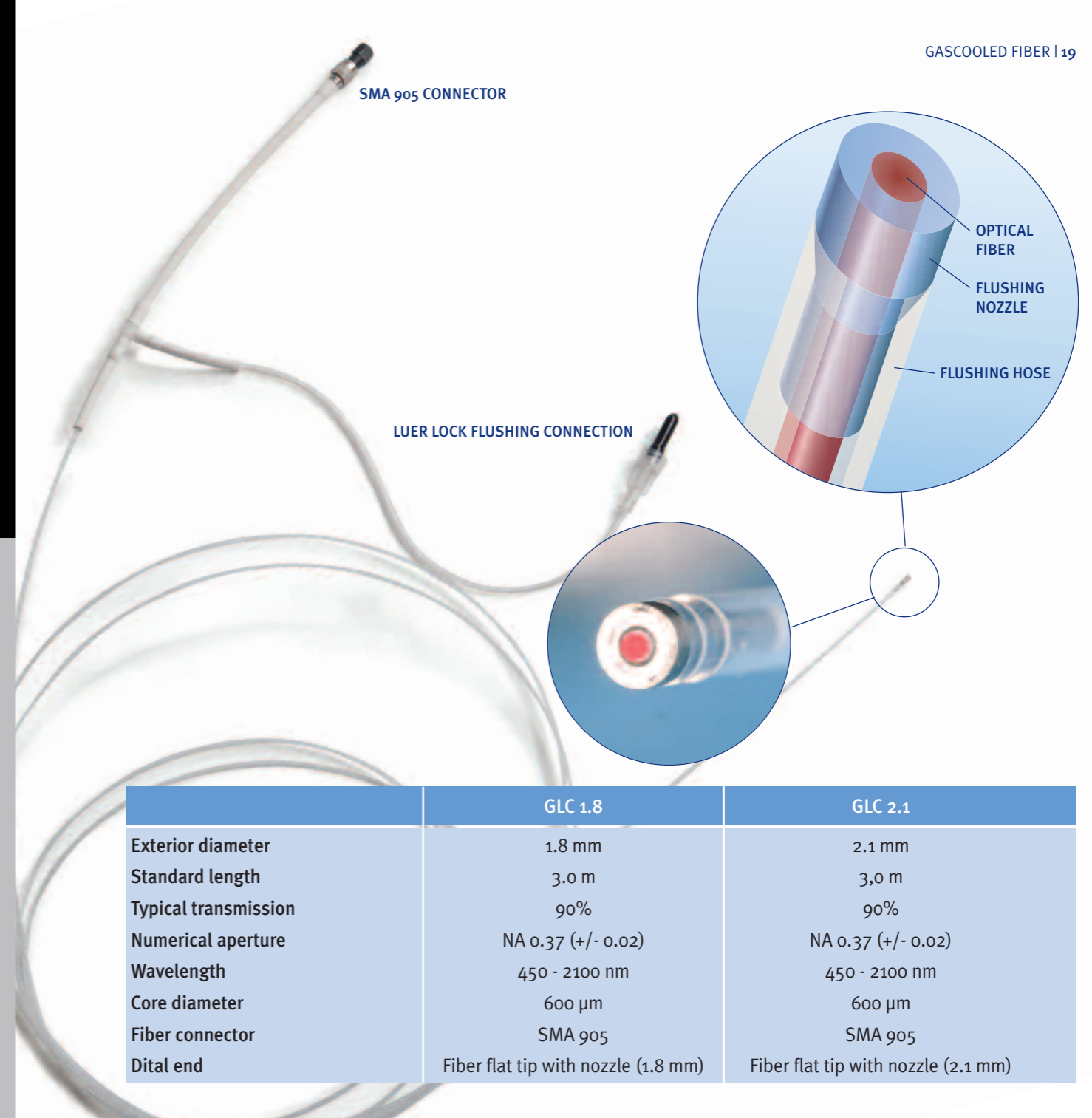


GASCOOLED FIBER



The LGO gascooled fiber has a fiber core diameter of 600 µm. The application diameter is between 1.8 and 2.1 mm. The distal end of the fiber has a flat tip with a nozzle. The medical application fields for the gascooled fiber are gastroenterology and pneumology, for instance. Laser coagulation as a method for medical application with this fiber has particularly proven itself for gastric tumors and carcinomas. It is also suitable for the therapy of vulnerable tumors and rare symptoms such as the GAVE syndrome ("watermelon stomach") and angiodysplasias. Last but not least, the use of the fiber for such medical application fields as argon plasma coagulation technology (APC) and electro-coagulation technology is also known.

The 600 µm fiber core diameter is ideally suitable for the use of the Nd:YAG laser, with which the most extensive experience has been gathered in thermal tumor destruction at a wavelength of 1064 nm according to medical process descriptions. In addition it is possible to equip the probe systems with an RFID chip including the required license which can be obtained from us (cf. page 32: RFID components). We of course also offer individual solutions.



	GLC 1.8	GLC 2.1
Exterior diameter	1.8 mm	2.1 mm
Standard length	3.0 m	3,0 m
Typical transmission	90%	90%
Numerical aperture	NA 0.37 (+/- 0.02)	NA 0.37 (+/- 0.02)
Wavelength	450 - 2100 nm	450 - 2100 nm
Core diameter	600 µm	600 µm
Fiber connector	SMA 905	SMA 905
Dital end	Fiber flat tip with nozzle (1.8 mm)	Fiber flat tip with nozzle (2.1 mm)

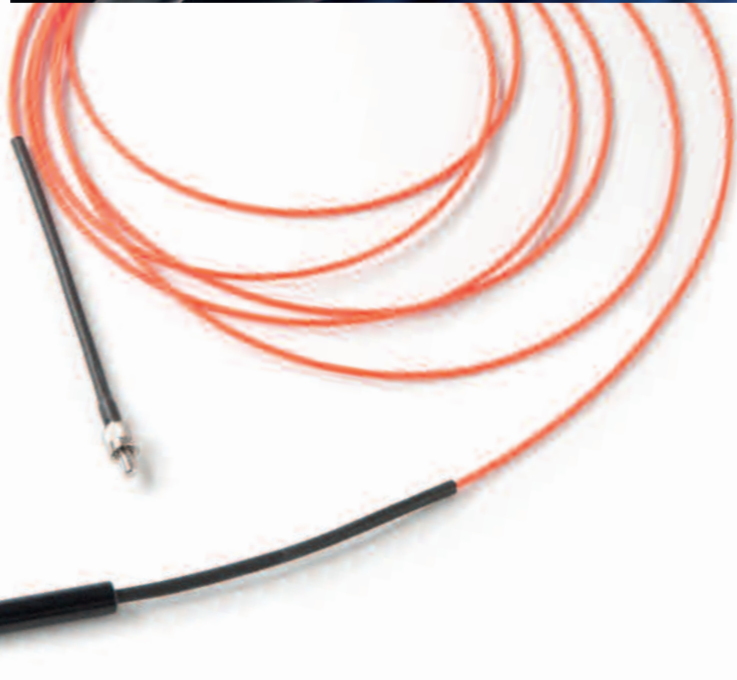
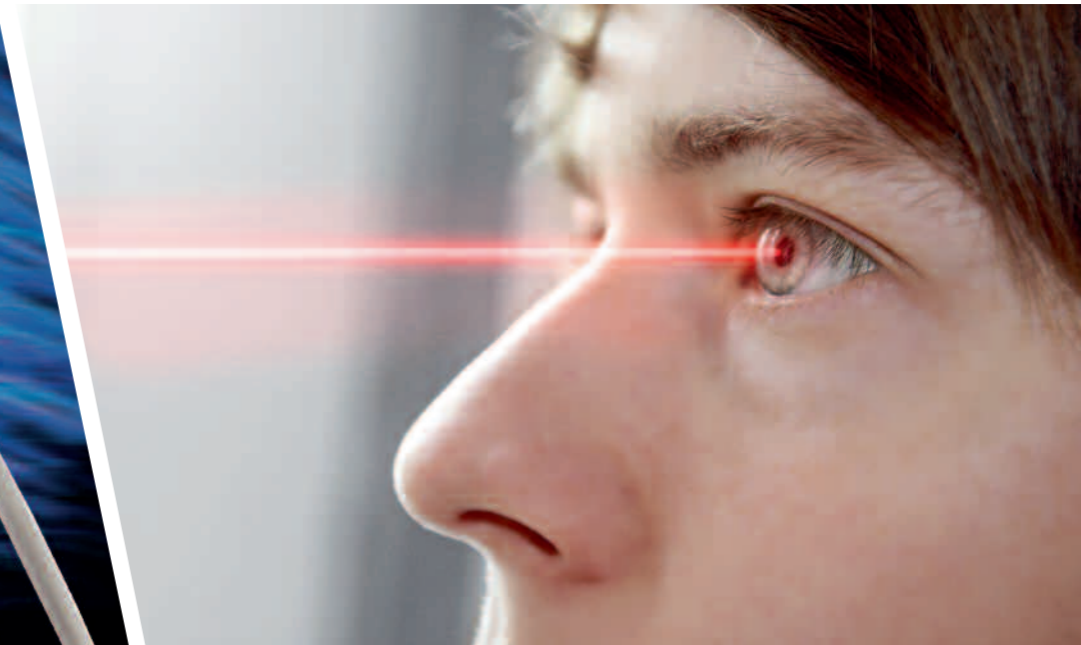
ENDOPROBE



With the LGO Endoprobe we have developed a precision instrument for highly effective and modern medical eye treatment. The LGO Endoprobe has a fiber core diameter of 200 μm . The application diameter is between 20 and 25 gauge. The fiber end is equipped with a handpiece with a stainless steel needle for safe guidance and exact positioning during application – a straight or bent needle is supplied upon request.

There are many application options for endoprobes in laser therapy: Whether retina diseases, glaucomas or cataracts – ophthalmology is a diverse medical discipline.

In addition it is possible to equip the probe systems with an RFID chip including the required license which can be obtained from us (cf. page 32: RFID components). We of course also offer individual solutions.



FIBER TYPE	Quarz/ Quarz, Quarz/ Quarz/ Hard Clad, Quarz/ Hard Clad
FIBER CORE DIAMETER	20 gauge, 23 gauge, 25 gauge
FIBER ENDS	Handpiece straight with stainless steel needle, handpiece bent with stainless steel needle
APPLICATION DIAMETER	200 μm

SIDE FIRE FIBER

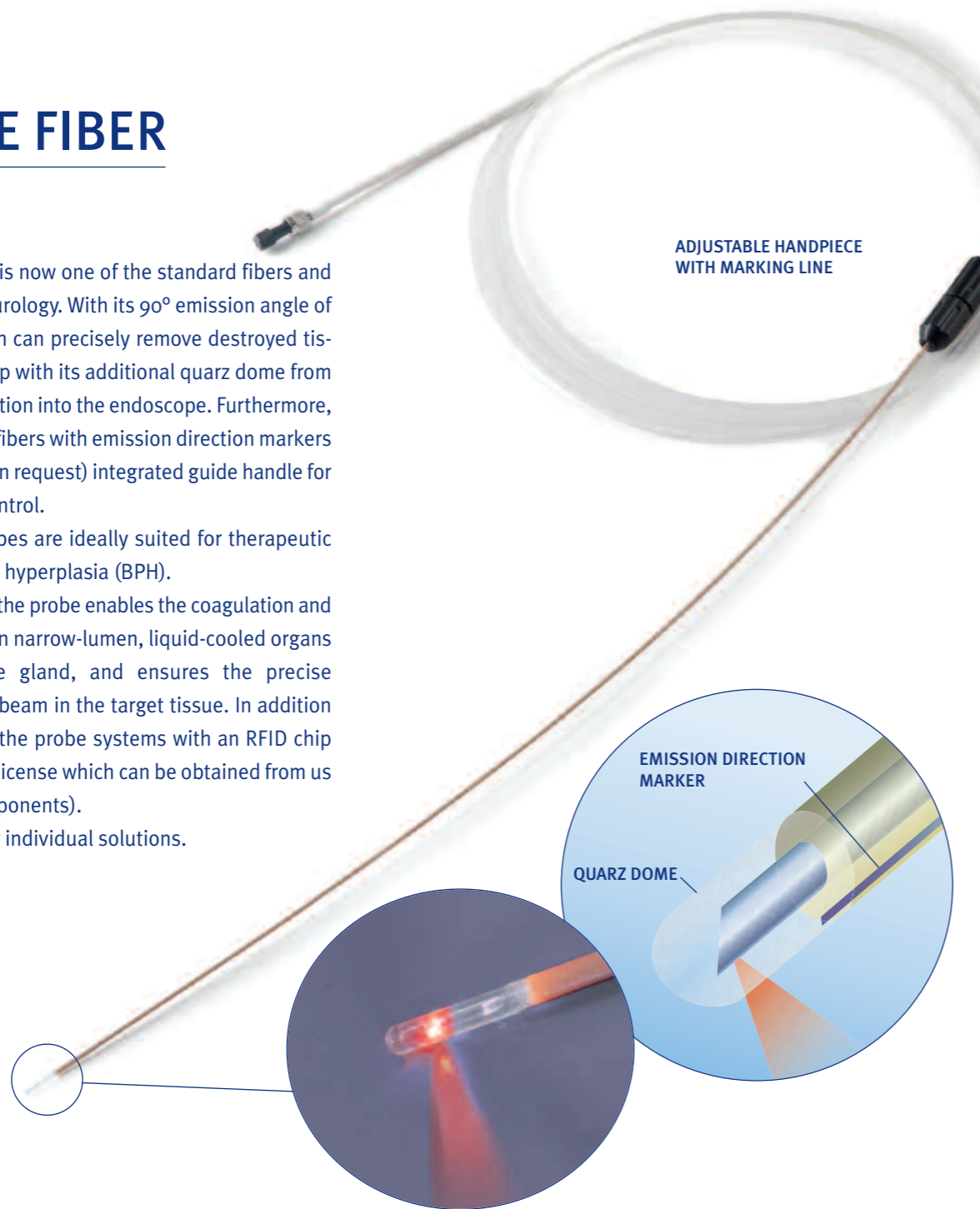


The LGO side fire fiber is now one of the standard fibers and is particularly used in urology. With its 90° emission angle of this probe, the surgeon can precisely remove destroyed tissue. The angled fiber tip with its additional quartz dome from LGO enables easy insertion into the endoscope. Furthermore, we have equipped the fibers with emission direction markers and an (adjustable upon request) integrated guide handle for accurate movement control.

LGO side fire fiber probes are ideally suited for therapeutic use in benign prostatic hyperplasia (BPH).

The lateral emission of the probe enables the coagulation and vaporization of tissue in narrow-lumen, liquid-cooled organs such as the prostate gland, and ensures the precise alignment of the laser beam in the target tissue. In addition it is possible to equip the probe systems with an RFID chip including the required license which can be obtained from us (cf. page 32: RFID components).

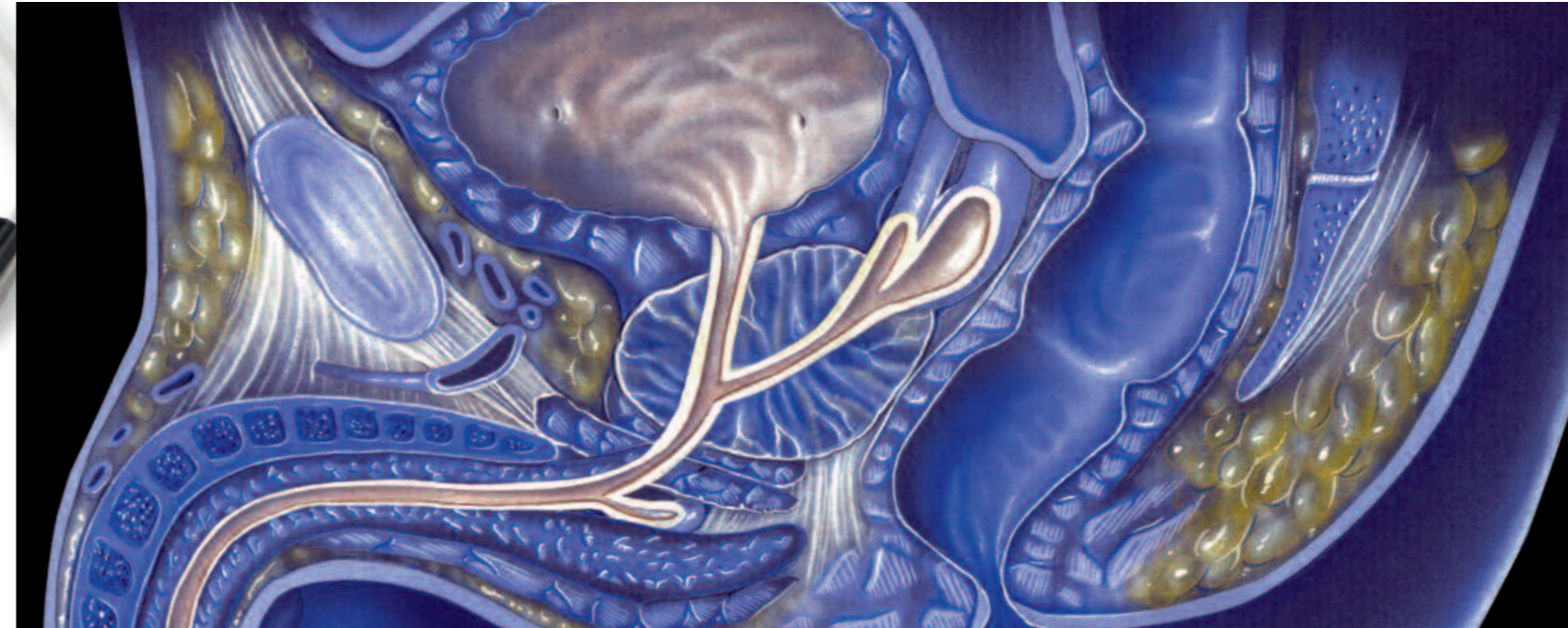
We of course also offer individual solutions.



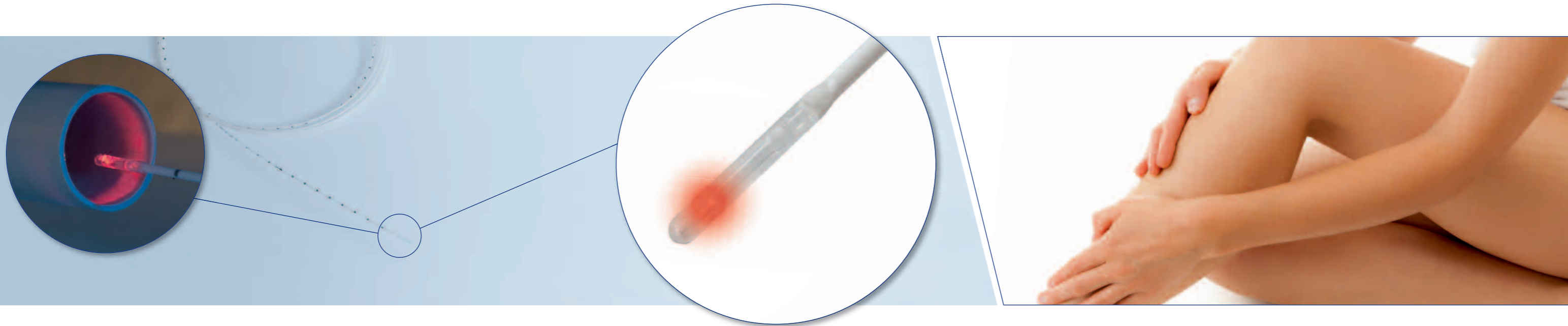
ADJUSTABLE HANDPIECE WITH MARKING LINE

EMISSION DIRECTION MARKER

QUARZ DOME



	SF 1.0	SF 1.8
Exterior diameter	1,0 mm	1,8 mm
Standard length	3,0 m	3,0 m
Typical transmission	80%	80%
Emission angle	80°	80°
Numerical aperture	0.22 - 0.37 (+/- 0,02)	0.22 - 0.37 (+/- 0.02)
Core diameter	400 µm	600 µm
Fiber connector	SMA 905	SMA 905



SATURN SIDE FIBER®, SATURN SLIGHT SIDE FIBER



The radially emitting medical probe serves for the endovenous laser treatment of the vena saphena magna and the vena saphena parva in patients with venous insufficiency. With its 360° emission and optimal handling, the Saturn fiber is a trendsetting development for medical applications in phlebology.

The markers encompassing the fiber provide additional aid for the physician.

The advantages are diverse:

- Reliable venous occlusion by 360° emission
- Easier handling than traditional surgery
- Faster treatment due to local anesthetic
- Painless treatment due to minimal puncture site, no post-operative side-effects
- First-class cosmetic results

- The patient is able to walk painlessly again only three hours after treatment.

We also offer the LGO Transradial Introducer Set to complete our Saturn Side Fiber®.

The Saturn slight side fiber is a new addition to the LGO range of products. With its very small exterior diameter it enables the optimal treatment of perforating veins and side branches.

In addition it is possible to equip the probe systems with an RFID chip including the required license which can be obtained from us (cf. page 32: RFID components). We of course also offer individual solutions.

	SATURN SIDE FIBER®	SATURN SLIGHT SIDE FIBER
Exterior diameter	1.8 mm	0.98 mm
Standard length	3.0 m	3.0 m
Typical transmission	98%	98%
Emission angle	65° from the fiber axis	65° from the fiber axis
Numerical aperture	0.37	0.37
Wavelength	e. g. 980 and 1470 µm	e. g. 980 and 1470 µm
Core diameter	600 µm	400 µm

TRANSRADIAL INTRODUCER SET



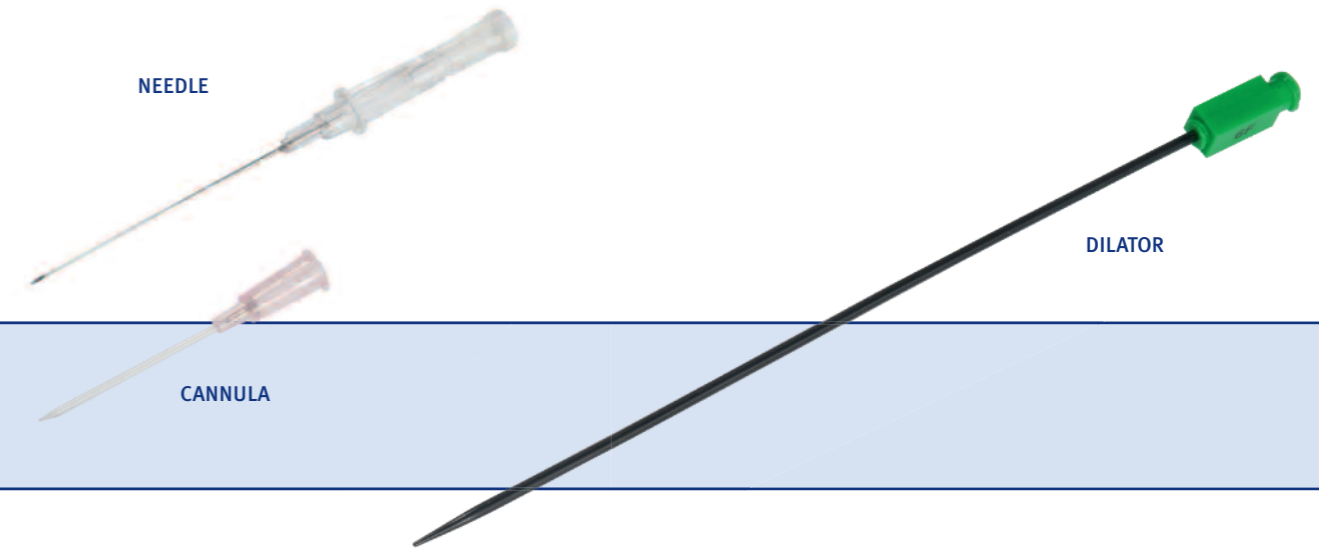
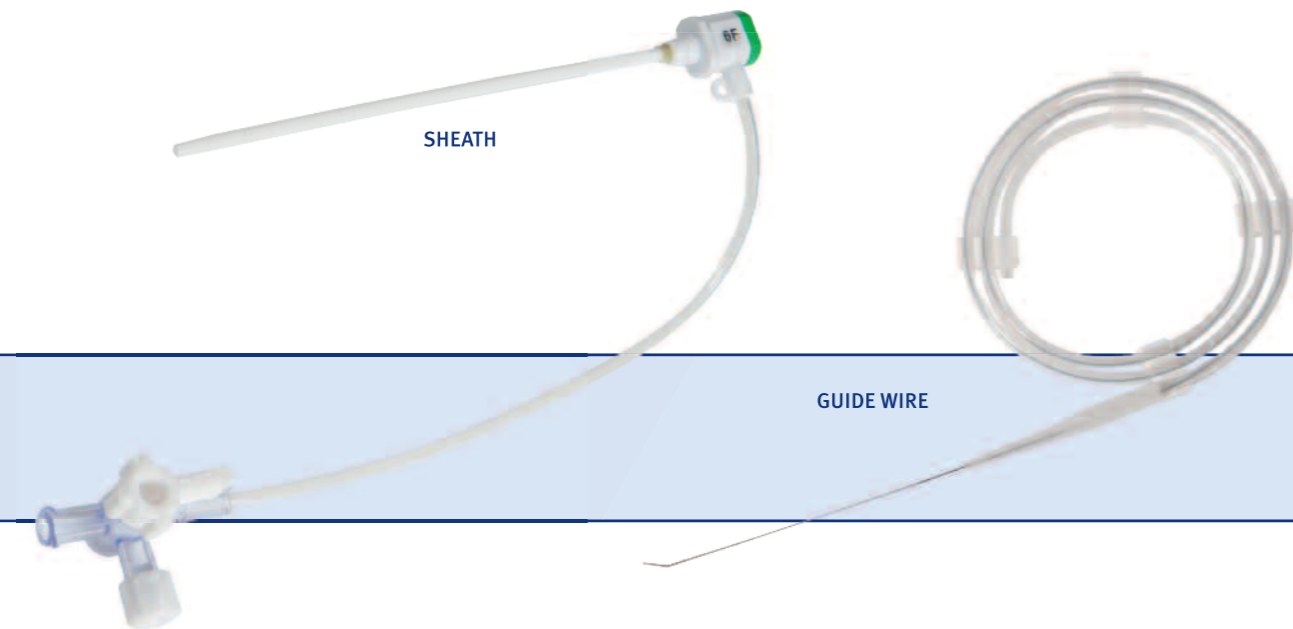
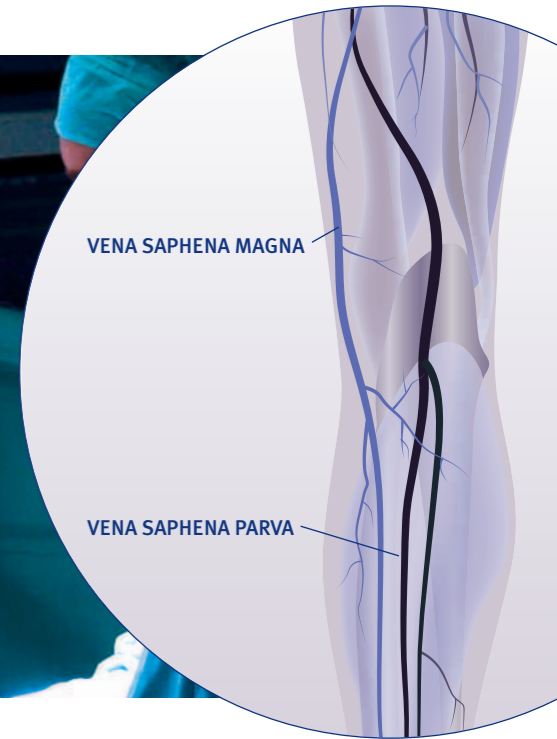
We have designed the LGO transradial introducer set as an introductory aid for the LGO Saturn side fiber® within the framework of phlebological therapy. The LGO transradial introducer set is an introducer set for peripheral veins with a size of 6 French and a length of 11 cm.

The set consists of the following components:

- Transradial Introducer Sheath + Dilator: 6F x 11 cm
- Guide wire: 0.018" x 65 cm
- Introducer Needle + cannula: 20G x 3.2 cm

The LGO transradial introducer set enables smooth intro-

duction of the LGO Saturn side fiber® into the vein and creates a safe intermediate space between the medical probe and the vein wall. The set has been developed for medical interventions for the reduction of vascular access complications. The compatibility of the size of the introducer set with the laser fiber is guaranteed by us upon joint use of the LGO transradial introducer sets and the LGO Saturn side fiber.



VENA INTRODUCER SET



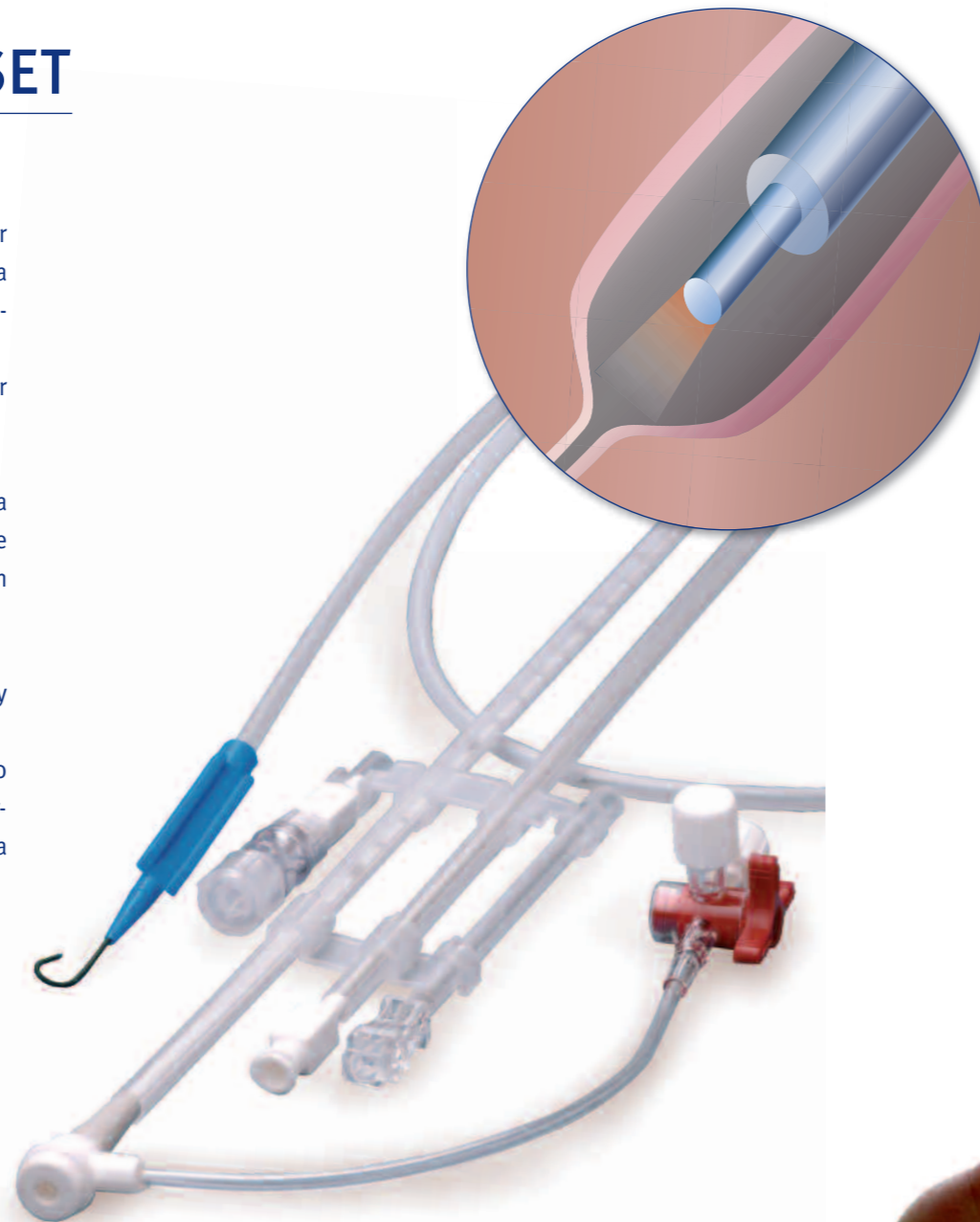
The LGO catheter system was developed especially for the minimally invasive treatment of an insufficient Vena saphena magna. All components required for the operation are safely packaged in a sterile bag.

You have the choice between the LGO VENA Introducer Set 55 cm and 100 cm.

The catheter is intended for introduction into the Vena saphena magna applying the Seldinger technique. The cannula included in the set is used to puncture the vein and introduce the guide wire, which is also enclosed.

The length markings at intervals of 1 cm enable easy establishment of the insertion length.

The laser fiber (LGO bare fiber 600 μm) is locked into place at the port with an adapter attached to the fiber-glass and juts out of the port by 1-2 cm. The LGO-Vena introducer set is intended for single use.



VENA INTRODUCER SET 55 cm

CANNULA:

18 G x 75 mm introduction cannula

GUIDE WIRE WITH INSERTION AID:

0.035" (0.9 mm) x 120 cm, PTFE-coated guide wire, Soft-J-Tip on one side with 3 mm radius and J-straightener, inserted in a spiral dispenser

CATHETER WITH HEMOSTATIC VALVE:

Port 5 FR x 55 cm, depth scaling 0 – 45 cm per cm, hemostatic valve with clip connection for TBA, 3-way valve

FIXATION OF LASER FIBER:

Tuohy Burst Adapter (TBA) with 0.025" gasket

- for use with LGO bare fiber 600 μm
- 120 cm J-tip guide wire
- 45/55 cm port/dilator
- 18 G cannula

VENA INTRODUCER SET 100 cm

CANNULA:

18 G x 75 mm introduction cannula

GUIDE WIRE WITH INSERTION AID:

0.035" (0.9 mm) x 220 cm, PTFE-coated guide wire, Soft-J-Tip on one side with 3 mm radius and J-straightener, inserted in a spiral dispenser

CATHETER WITH HEMOSTATIC VALVE:

Port 5 FR x 100 cm, depth scaling 0 – 90 cm per cm, hemostatic valve with clip connection for TBA, 3-way valve

FIXATION OF LASER FIBER:

Tuohy Burst Adapter (TBA) with 0.025" gasket

- for use with LGO bare fiber 600 μm
- 220 cm J-tip guide wire
- 100 cm port/dilator
- 18 G cannula

MEDICAL BUNDLE

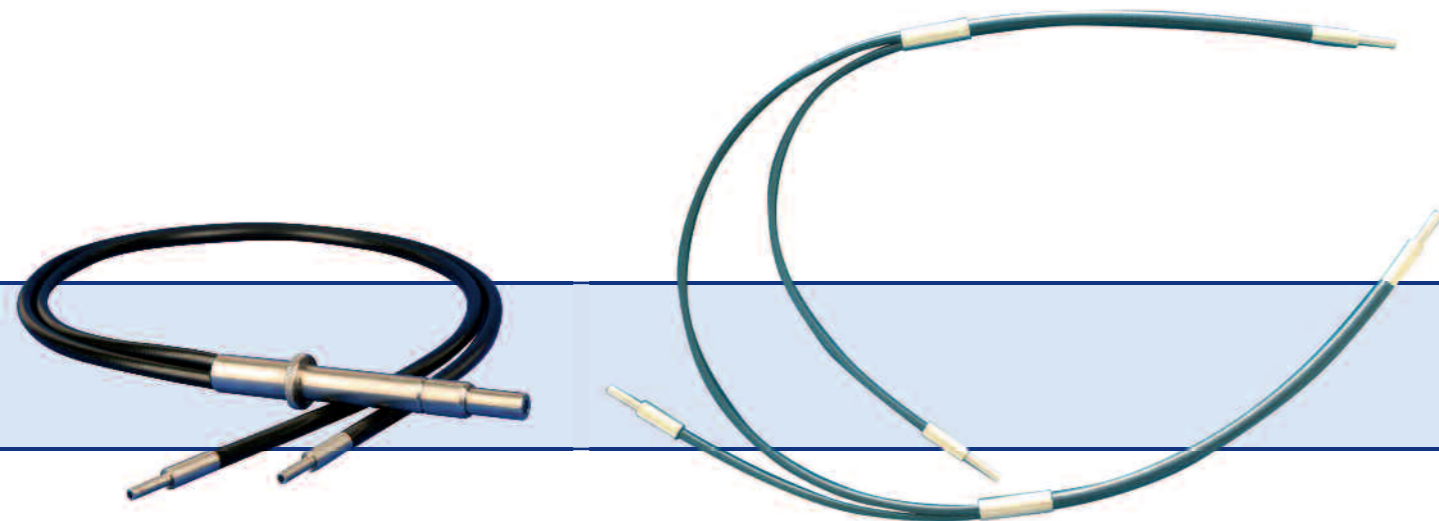


The LGO Medical Bundle is a medical fiber optic cable bundle, which is connected to a light source and e. g. to a spectrometer using the respectively matching connector or connector system. It transfers the light output to the application side on the patient. The application side of the fiber optic cable bundle can have various designs, depending on the application and application area. It is used with and without direct patient contact. The application side of the bundle is applied to the local treatment area of the patient, either directly or via an application system.

Optical measuring data can be collected during treatment,

for example. The product is available e.g. as a non-fused or fused fiber bundle in the following variants: Round to line, round to round, round to rectangular.

LGO Medical Bundles are available in sterile and unsterile design.



MEDICAL JUMPER CABLE

The LGO Medical Jumper Cable is used for the connection or extension of medical laser supply systems, such as a slit lamp (coupled with a laser light source) or a handpiece for fiber optic cable probes. The use of a jumper cable is intended for the transmission of a light output from a light source to a piece of equipment, e.g. an optical handpiece. Laser appliances or spectrometers can be used as a medical light source, for instance. The compatible connection is decisive here for functionality (passing on of laser energy from the system to the patient). The transmitted light output does not change whatsoever between the coupling and uncoupling side.

LGO medical jumper cables are available in sterile and unsterile design.





RFID-TAG

- Differently structured TAGs can be integrated into the connectors
- The TAG type and the antennas depend on the RFID system, the memory, the frequency, the password protection, the write protection, the read/write function, the memory access and the customer code.
- The RFID system reader/writer, the software and the front panels must be made by the customer.

CUSTOMIZED RFID CONNECTORS

- Manufacture of customized connectors and adapters
- The development of the RFID integrated connection process of the fiber optic connectors used for identification is patented.
- Manufacturers of laser appliances, connectors and cable and fiber sets can receive licenses.

CONNECTORS FOR MEDICAL USE

- The RFID TAG is located in the F-SMA connector.
- For the control of the lifelong process for use and reuse
- Sterilization/autoclavable in simple processes for use and reuse

FIBER OPTIC RFID COMPONENTS

FOR THE WIRELESS IDENTIFICATION AND CONTROL OF THE PRODUCT

With the purchase of a medical RFID probe directly from us, you also acquire the right to legally use and market the patented RFID system in the laser technology field. As the user you can not only purchase the suitable probes with integrated chip for your laser systems, but also acquire the license for the use of the entire RFID system. The patented method may only be applied worldwide with a corresponding license.



HANDPIECES

Models:

Focusing handpieces, surgical handpieces, orthopedic handpieces

Available connector types:

HGM, Nidek, Dornier, BST, Coherent, LM, FCPC, DIN

We also offer you surgical and orthopedic handpieces for our fibers. The application needle is screwed to the front of the handpiece. The rear detachable part of the handpiece fixes the fiber in longitudinal direction by turning to the right using the internal collet.

We will be pleased to produce special fibers with dimensions and data in exact compliance with your requirements and for your individual laser system. Ask for a non-binding quotation.

Fantastic to visualize
as a natural phenomenon

TOTAL REFLECTION

Engineered solutions
with optical fibers

THERE ARE MANY SOLUTIONS – LGO SUPPORTS THEM.

In addition to our product portfolio for medical fibers, we offer product solutions for industrial applications.

